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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/830,043	KOO ET AL.
	Examiner	**Art Unit**	
	Jean E. Lesperance	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2007*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   The amendment filed December 17, 2007 is entered and claims 1-27 are

pending.

Response to Arguments

2.   Applicant's arguments with respect to claims 1-27 have been considered but are

moot in view of the new ground(s) of rejection. .

Specification

3.   The abstract of the disclosure is objected to because it does not have the proper

content of the disclosure. The content of the -present abstract is related to a ventilation

interface and system. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-6, 8 and 14-18, 20, 26, and 27 are rejected under 35 U.S.C. 103(a) as

being unpatentable over US Patent No. 6,512,838 by Rafii et al.

Regarding claim 1, Rafii et al. teach a 3D-input device for inputting information

using a virtual keyboard (a three-dimensional sensor system 10 comprising a three-

dimensional sensor 20 focused essentially edge-on towards the fingers 30 of a user's

hands 40, as the fingers "type" on a substrate 50, shown here atop a desk or other work

surface 60 (column 7, lines 62-66) wherein substrate 50 and/or template 70 may be

referred to herein as a <u>virtual keyboard</u> or virtual device for inputting digital data and/or

commands (column 8, lines 18-20)), comprising:

a hand position and finger order determination unit that determines which button

of a plurality of buttons of the virtual keyboard is stroked and which fingers are used to

stroke the stroked button (a mapping of the positions of the user's <u>fingers</u> to specific

keyboard keys at a rest position is defined. For instance, routine 285 and CPU 270 can

instruct the companion device 80 that, at rest, the user's left hand <u>fingers</u> touch the :"A",

"S", "D" and "F" keys, and the user's right hand <u>fingers</u> touch the "J", "K", "L", and ":"

keys(column 18, lines 51-56)); see Fig.7A for the hand positioning and finger

determination order.

a key information storage unit (memory and software Fig.3 (280 and 285)) that

stores key values respectively mapped to a predetermined button of the plurality of

buttons of the virtual keyboard and fingers used to stroke the predetermined button

(routine 285 in essence moves or relocates the virtual keyboard to under the user's

fingers. Such procedure may be carried out by <u>mapping</u> the image obtained from sensor

20 to the fingers of the template, and then <u>mapping</u> the touched keys to the natural

position for the user, which natural position was determined during the template

construction phase (column 21, lines 35-41)); and

a key determination unit (software routine Fig.3 (285)) that finds a key value by

matching the stroked button and fingers used to stroke the stroked button with the

predefined button and fingers mapped in the key information storage unit (routine 285 in

essence moves or relocates the virtual keyboard to under the user's fingers. Such

procedure may be carried out by <u>mapping</u> the image obtained from sensor 20 to the fingers of the template, and then <u>mapping</u> the touched keys to the natural position for the user, which natural position was determined during the template construction phase (column 21, lines 35-41)) wherein the software 285 is a code or routine which works with the memory 280 to store different finger positions of the user's hand. The prior art does not specifically teach a key determination unit that finds a key value by matching the stroked button and fingers used to stroke the stroked button with the predefined button and fingers mapped in the key information storage unit. However, the prior art teaches the routine 285 in essence moves or relocates the virtual keyboard to under the user's fingers. Such procedure may be carried out by <u>mapping</u> the image obtained from sensor 20 to the fingers of the template, and then <u>mapping</u> the touched keys to the natural position for the user, which natural position was determined during the template construction phase (column 21, lines 35-41)) wherein the software 285 is a code or routine which works with the memory 280 to store different finger positions of the user's hand. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the routine 285 in essence moves or relocates the virtual keyboard to under the user's fingers. Such procedure may be carried out by <u>mapping</u> the image obtained from sensor 20 to the fingers of the template, and then <u>mapping</u> the touched keys to the natural position for the user, which natural position was determined during the template construction phase (column 21, lines 35-41)) wherein the software 285 is a code or routine which works with the memory 280 to store different finger positions of the user's hand to obtain a key determination unit that finds

a key value by matching the stroked button and fingers used to stroke the stroked

button with the predefined button and fingers mapped in the key information storage unit

because this would provide the distance the object moves between two frames falls

within the measurement accuracy of the system.

Regarding claim 2, Rafii et al. teach the key determination unit (software routine

Fig.3 (285)) outputs the selected key value (routine 285 in essence moves or relocates

the virtual keyboard to under the user's fingers. Such procedure may be carried out by

mapping the image obtained from sensor 20 to the fingers of the template, and then

mapping the touched keys to the natural position for the user, which natural position

was determined during the template construction phase (column 21, lines 35-41)) where

the software or routine outputs the selected key value by mapping the touched keys to

natural position for the user.

Regarding claim 3, Rafii et al. teach a sensing device that senses a user's finger

movements (a keystroke can be sensed as commencing with a detected finger up

movement followed by a quick finger down motion (column 19, lines 8-10)); and

a signal processing unit (CPU or controller Fig.3 (260)) that processes a signal

output from the sensing device to detect the movement of the user's fingers(a keystroke

can be sensed as commencing with a detected finger up movement followed by a quick

finger down motion (column 19, lines 8-10)), wherein the hand position and finger order

determination unit utilizes information output by the signal processing unit to determine

the selected button and the order of the user's fingers (routine 285 uses Z-axis distance

measurements to determine position of the fingers with respect to the rows of the virtual

keyboard, e.g., distance Z1 or Z2 in FIG. 1A (column 18, lines 28-31)).

Regarding claim 4, Rafii et al. teach the sensing device (three-dimensional sensor Fig.1A (20) comprises a plurality of sensors (rays Fig.1A (140) arranged individually on a user's fingers Fig.1A (30) wherein the sensor (20) comprises a plurality of rays (140) which represents a plurality of sensors.

Regarding claim 5, Rafii et al. teach in the key information storage unit (memory and software Fig.3 (280 and 285)), key values are allocated to each of the plurality of buttons of the virtual keyboard based upon the number of sensors (Sensor 20 is aimed along the Z-axis to determine which of the user's finger tips 30 touch what portions of template 70, e.g., touch which virtual keys, in what time order (column 11, lines 3-6) wherein the number of portions touched of template 70 represents the number of sensors.

Regarding claim 6, Rafii et al. teach the virtual buttons are arranged so that the key values are ordered by frequency of use (Turning now to operation of three-dimensional sensor 20, the sensor emits radiation of a known frequency and detects energy returned by surfaces of objects within the optical field of view (column 10, line 66 to column 11, line 2) wherein the sensor 20 emits radiation only when there is a number of keys being striped and depending on how many times a key or button is being pressed is the frequency of use.

Regarding claim 8, Rafii et al. teach the virtual buttons include key values that are defined by the user (When a key is actually struck (as perceived by the user's finger movement), the struck key may be highlighted using a different color or contrast. If the

virtual keys are not in a correct rest position, the user can command the companion

device to position the virtual keyboard or other input device in the proper starting

position. For instance, if the user typically begins to key by placing the right hand fingers

on home row J, K, L, and ":" keys, and the left fingers on F, D, S and A keys, the

software will move the keys of the virtual keyboard to such a position (column 18, lines

47-56) wherein depending on the user's finger position, the software (285) maps the key

value position to the virtual buttons.

Regarding claim 14, Rafii et al. teach a 3D-input method for inputting information

using a virtual keyboard (a three-dimensional sensor system 10 comprising a three-

dimensional sensor 20 focused essentially edge-on towards the fingers 30 of a user's

hands 40, as the fingers "type" on a substrate 50, shown here atop a desk or other work

surface 60 (column 7, lines 62-66) wherein substrate 50 and/or template 70 may be

referred to herein as a virtual keyboard or virtual device for inputting digital data and/or

commands (column 8, lines 18-20)) comprising:

sensing a stroke of a virtual button of the virtual keyboard by a user (the sensor

Fig.1a (20) detects the user's finger that touched the template (70) (virtual keyboard)

(column 21, lines 37-41));

sensing positions of the user's fingers relative to the virtual button, and which

fingers are used to stroke the virtual button (When a key is actually struck (as perceived

by the user's finger movement), the struck key may be highlighted using a different color

or contrast. If the virtual keys are not in a correct rest position, the user can command

the companion device to position the virtual keyboard or other input device in the proper

starting position. For instance, if the user typically begins to key by placing the right

hand fingers on home row J, K, L, and ":" keys, and the left fingers on F, D, S and A

keys, the software will move the keys of the virtual keyboard to such a position (column

18, lines 47-56); and

identifying a stroked key value corresponding to the sensed virtual button, the

sensed and the fingers used to stroke the virtual button (templates preferably are used

in the present invention to help identify user finger positions from data obtained from

sensor 20. Templates can assist classification algorithm (or classifier) 285 in

distinguishing boundaries between fingers when discontinuities are not necessarily

apparent. For example, in FIG. 7A, the third and fourth user's fingers (fingers 3 and 4)

are relatively close together (column 21, lines 15-22). The prior art does not specifically

teach identifying a stroked key value corresponding to the sensed virtual button, the

sensed and the fingers used to stroke the virtual button. However, the prior art teaches

templates preferably are used in the present invention to help identify user finger

positions from data obtained from sensor 20. Templates can assist classification

algorithm (or classifier) 285 in distinguishing boundaries between fingers when

discontinuities are not necessarily apparent. For example, in FIG. 7A, the third and

fourth user's fingers (fingers 3 and 4) are relatively close together (column 21, lines 15-

22). Thus, it would have been obvious to a person of ordinary skill in the art at the time

the invention was made to modify templates preferably are used in the present invention

to help identify user finger positions from data obtained from sensor 20. Templates can

assist classification algorithm (or classifier) 285 in distinguishing boundaries between

fingers when discontinuities are not necessarily apparent. For example, in FIG. 7A, the

third and fourth user's fingers (fingers 3 and 4) are relatively close together (column 21,

lines 15-22) to obtain identifying a stroked key value corresponding to the sensed

virtual button, the sensed and the fingers used to stroke the virtual button because this

would provide the distance the object moves between two frames falls within the

measurement accuracy of the system.

Regarding claim 15, Rafii et al. teach outputting the selected key value (routine

285 in essence moves or relocates the virtual keyboard to under the user's fingers.

Such procedure may be carried out by mapping the image obtained from sensor 20 to

the fingers of the template, and then mapping the touched keys to the natural position

for the user, which natural position was determined during the template construction

phase (column 21, lines 35-41)) where the software or routine outputs the selected key

value by mapping the touched keys to natural position for the user.

Regarding claim 16, Rafii et al. teach sensing the selection of a virtual button

comprises arranging a plurality of sensors individually on the user's fingers and

determining the position of those sensors relative to the virtual button (routine 285 in

essence moves or relocates the virtual keyboard to under the user's fingers. Such

procedure may be carried out by mapping the image obtained from sensor 20 to the

fingers of the template, and then mapping the touched keys to the natural position for

the user, which natural position was determined during the template construction phase

(column 21, lines 35-41)) wherein the sensor 20 detects the position of the user's finger

when touched and the routine 285 maps the image obtained from the rays of the sensor

to the fingers of the template.

Regarding claim 17, Rafii et al. teach the plurality of stored key values are stored by mapping key values to respective predefined virtual buttons and a predefined order of the user's fingers used to select the predefined button (the user's fingers are placed in a typing position in the work surface in front of three-dimensional sensor 20, either on a virtual keyboard or simply on the work surface. This step is used to map the user fingers to the elements of the template and to calibrate the user's fingers to the keys of the virtual keyboard (or work surface) before a typing session starts (column 20, lines 27-33)) wherein the software or routine maps the predefined positions to the virtual keyboard.

Regarding claim 18, Rafii et al. teach the virtual buttons are arranged so that the key values are ordered by frequency of use (Turning now to operation of three-dimensional sensor 20, the sensor emits radiation of a known frequency and detects energy returned by surfaces of objects within the optical field of view (column 10, line 66 to column 11, line 2) wherein the sensor 20 emits radiation only when there is a number of keys being striped and depending on how many times a key or button is being pressed is the frequency of use.

Regarding claim 20, Rafii et al. teach the virtual buttons include key values that are defined by the user (When a key is actually struck (as perceived by the user's finger movement), the struck key may be highlighted using a different color or contrast. If the virtual keys are not in a correct rest position, the user can command the companion device to position the virtual keyboard or other input device in the proper starting

position. For instance, if the user typically begins to key by placing the right hand fingers

on home row J, K, L, and ":" keys, and the left fingers on F, D, S and A keys, the

software will move the keys of the virtual keyboard to such a position (column 18, lines

47-56) wherein depending on the user's finger position, the software (285) maps the key

value position to the virtual buttons.

Regarding claim 26, Rafii et al. teach a soft key (soft keyboard Fig.1B (105))

mapping method for mapping keys onto virtual buttons of a virtual keyboard (software or

routine Fig.3 (285)) that are selected by a user's fingers upon which are individually

mounted a plurality of sensors (the sensor (20) comprises a plurality of rays (150)

projected on each finger represent a plurality of sensors), the method comprising:

determining the number of sensors (the sensor Fig.1B (20) comprises a plurality

of rays (150) projected on each finger represent the number of sensors));

allocating key values according to the number of sensors and mapping the

allocated key values onto a first virtual button (the classifier uses this template to quickly

map image in acquired frames to each user's fingers. As part of the template

construction, preferably a mapping of the positions of the user's fingers to specific

keyboard keys at a rest position is defined. For instance, routine 285 and CPU 270 can

instruct the companion device 80 that, at rest, the user's left hand fingers touch the :"A",

"S", "D" and "F" keys, and the user's right hand fingers touch the "J", "K", "L", and ":"

keys (column 20, lines 4-13)); and

repeating the determining, allocating and mapping for the remaining virtual

buttons (three-dimensional sensor 20 will be repeatedly capturing the contour map of

the user's fingers. The data thus captured will be placed, e.g., by software 285 in a table or matrix such as shown in FIGS. 7A-7O (column 20, lines 34-37)). The prior art does not specifically teach repeating the determining, allocating and mapping for the remaining virtual buttons. However, the prior art teaches three-dimensional sensor 20 will be repeatedly capturing the contour map of the user's fingers. The data thus captured will be placed, e.g., by software 285 in a table or matrix such as shown in FIGS. 7A-7O (column 20, lines 34-37). thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify three-dimensional sensor 20 will be repeatedly capturing the contour map of the user's fingers. The data thus captured will be placed, e.g., by software 285 in a table or matrix such as shown in FIGS. 7A-7O (column 20, lines 34-37) to obtain repeating the determining, allocating and mapping for the remaining virtual buttons because this would provide the distance the object moves between two frames falls within the measurement accuracy of the system.

Regarding claim 27, Rafii et al. teach a virtual keyboard comprising a plurality of virtual buttons selectable by a user's fingers upon which are mounted a plurality of sensors, the virtual keyboard constructed by mapping key values onto each of the virtual buttons and arranging the virtual buttons according to a predetermined condition using a method (routine 285 in essence moves or relocates the virtual keyboard to under the user's fingers. Such procedure may be carried out by mapping the image obtained from sensor 20 to the fingers of the template, and then mapping the touched keys to the natural position for the user, which natural position was determined during

the template construction phase (column 21, lines 35-41)) wherein the software 285 is a

code or routine which works with the memory 280 to store different finger positions of

the user's hand) comprising:

determining the number of sensors (the sensor Fig.1B (20) comprises a plurality

of rays (150) projected on each finger represent the number of sensors));

allocating key values according to the number of sensors and mapping the

allocated key values onto a first virtual button (the classifier uses this template to quickly

map image in acquired frames to each user's fingers. As part of the template

construction, preferably a mapping of the positions of the user's fingers to specific

keyboard keys at a rest position is defined. For instance, routine 285 and CPU 270 can

instruct the companion device 80 that, at rest, the user's left hand fingers touch the :"A",

"S", "D" and "F" keys, and the user's right hand fingers touch the "J", "K", "L", and ":"

keys (column 20, lines 4-13)); and repeating the determining, allocating and mapping

for the remaining virtual buttons (three-dimensional sensor 20 will be repeatedly

capturing the contour map of the user's fingers. The data thus captured will be placed,

e.g., by software 285 in a table or matrix such as shown in FIGS. 7A-7O (column 20,

lines 34-37)). Same motivation as in claim 26.

5.   Claims 7, 9-11, 19, 21-23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over US Patent No. 6,512,838 ("Rafii et al.") in view of US Patent

Application No. 20050104869 ("Chung").

Regarding claims 7 and 19, Rafii et al. teach all the claimed limitations with the exception of providing the virtual buttons are arranged so that the key values are in alphabetical order.

However, Chung teaches as shown in FIG. 1b, "2" key has letters "ABC" imprinted thereon. Each number key has letters imprinted thereon, respectively. The alphabet is grouped into sets of 3 letters according to the alphabetical order.

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize the key "2" that has the letters "ABC" as taught by Chung in the three-dimensional virtual keyboard disclosed by Rafii et al. because this would provide a method for character entry that the desired character can be entered separately on each of a real keypad entry mode and a virtual keypad entry mode according to the prescribed way although the identical key is pressed in each of both modes, by establishing separately the entry mode of a virtual keypad that maintains the state of an independent entry mode regardless of the entry mode of a real keypad and the key presses on a real keypad (paragraph 0017).

Regarding claims 9 and 21, Chung teaches each virtual button comprises two key values ("Q" and "Z" is allocated to "1" key due to the low frequency of use (Fig.1b) wherein the key "1" has two key values. Same motivation as claim 7.

Regarding claims 10 and 22, Chung teaches each virtual button comprises three key values (as shown in FIG. 1b, "2" key has letters "ABC" imprinted thereon. Each number key has letters imprinted thereon, respectively. The alphabet is grouped into sets of 3 letters according to the alphabetical order)wherein the Key "2" has three letter

values. Same motivation as claim 7.

Regarding claims 11 and 23, Chung teaches each virtual button comprises four key values (in Fig.1c of the prior art, key "9" has a four key values (WXYZ). Same motivation as claim 7.

6.   Claims 12, 13, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,512,838 ("Rafii et al.") in view of US Patent Application No. 20030193478 ("Ng et al.").

Regarding claims 12, 13, 24, and 25, Rafii et al. teach all the claimed limitations with the exception of providing each virtual button comprises five key values and six key values.

However, Ng et al. teach a visual mapping reduced keyboard Fig.1 (10) wherein key1 has 6 characters mapped to it (paragraph 0064) and key4 has 5 characters mapped to it (paragraph 0067).

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize the five and six key values as taught by Ng et al. into the three-dimensional virtual keyboard disclosed by Rafii et al. because this would provide each key having at least one feature wherein the feature is a data value (paragraph 0010).

Conclusion

7.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean Lesperance whose telephone number is (571) 272-7692. The examiner can normally be reached on from Monday to Friday between

10:OOAM and 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Richard Hjerpe, can be reached on (571) 272-7691.

Any response to this action should be mailed to:

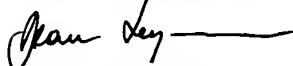Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(571) 273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal

drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the technology Center 2600 Customer Service Office

whose telephone number is (703) 306-0377.

Jean Lesperance

Art Unit 2629

Date 1/21/2008